Endoscopic Tattooing

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Abstract

Endoscopic tattooing is one of the most useful tools for the localization of small colorectal lesions, especially in the laparoscopic setting. This minimally invasive endoscopic procedure has a low risk of complications, provided that the injection technique is performed adequately. Here the author demonstrates the procedure, as well as the macroscopic appearance of the tattoo and its appearance 6 weeks later. This article is part of an expert video encyclopedia.

Keywords

Colorectal cancer; Complication; Endoscopic tattooing; Preoperative localization; Standard endoscopy; Video.

Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70155-9

Technique

Colonoscopy.

Materials

- Colonoscope: EC 530WI; Fujifilm, Tokyo, Japan.
- Injection needle: InjectorForce; Olympus, Tokyo, Japan.
- Marking ink: SPOT; GI Supply, Camp Hill, PA, USA.

Background and Endoscopic Procedure

The endoscopic or intraoperative localization of a small lesion or a previous polypectomy site is often challenging. In these scenarios, endoscopic tattooing is a useful approach. The accuracy of endoscopic tattooing for localization varies from 70% to 100%. The marking solution is either prepared (e.g., India ink with 0.9% normal saline in a 1:100 dilution that is sterilized by autoclaving or passage through a bacteriostatic Millipore filter)[1,2] or purchased. SPOT (GI Supply, Camp Hill, PA, USA) is a non-India ink permanent marker for endoscopic tattooing that is composed of highly purified and very fine carbon particles. SPOT is the only substance that has been approved by the US Food and Drug Administration for endoscopic tattooing. Askin *et al.*[3] reported on the safety and efficacy of SPOT in 113 patients who underwent endoscopic tattooing. None of the patients developed symptoms or signs of inflammation after the procedure. The SPOT stain remained for up to 1 year in this study.

The crucial point in endoscopic tattooing is the depth of injection. An optimal technique is needed to prevent possible complications due to transmural injections (with dye spillage into the intraperitoneal cavity) and invisible lesions from superficial injections. Instead of simple injection of the ink in the unit, a two-step marking method to avoid injection of dye into the peritoneal cavity is preferred. The injection of 1 ml of saline solution into the submucosal space is performed initially to create a bleb. 2 ml of India ink is subsequently injected into the saline blebs. Previous experience and some data suggest that the rate of complications might be lower in patients who underwent the two-step approach (1.8% vs. 8.3%, $P=0.297$).[4] Which marker substance should be preferred? For economical reasons, sterilized India ink is applied in cases where the ink marking is not needed permanently (e.g., patients undergoing surgery within the next couple of days), and injection of SPOT in all other cases.

It is possible that endoscopic tattooing is invisible at laparoscopy because the marker was injected into the mesenteric or retroperitoneal side of the intestine. To prevent this failure, a 'four-quadrant' circumferential tattooing technique is recommended to improve intraoperative visualization.

There is an interesting point regarding tattooing that should be mentioned. In addition to the direct benefit of localization at surgery, there might also be an indirect benefit of endoscopic tattooing: It improves the adequacy of lymph node dissection from pathological analysis in terms of the number of lymph nodes harvested from the surgical specimens as a result of likely staining in the lymphatic system. One retrospective study demonstrated a significantly higher mean number of lymph nodes examined in tattooed specimens than in nontattooed specimens (23 vs. 19, $P=0.03$).[5]

Key Learning Points/Tips and Tricks

- Endoscopic tattooing with India ink or SPOT facilitates endoscopic or intraoperative localization of a small lesion or a previous polypectomy site, especially at laparoscopy.

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- To avoid injection of the ink in the peritoneal cavity, a two-step marking method is recommended: first create a submucosal bleb with saline, and afterward inject the marking substance inside the bleb.
- The number of complications is small but not limited, and most are related to transmural injection.

Complications and Risk Factors

The number of complications is small but not limited, and most are related to transmural injection. The reported spillage rates vary from 3% to 13%,[1–5] but most patients with dye spillage remain asymptomatic. However, case reports and case series of the adverse effects of endoscopic tattooing, including focal peritonitis, abscess formation, postoperative adhesions, and tumor inoculation have been published. However, it is assumed that the majority of complications can be prevented by following recommendations, including the injection techniques.

Scripted Voiceover

In this patient we resected a flat adenoma suspicious for advanced neoplasia. For easy endoscopic follow-up and surveillance we perform endoscopic tattooing 4 cm proximal of the adenoma. It is crucial to avoid transmural injections that lead to dye spillage into the intraperitoneal cavity. To this end after puncturing the wall we create a small submucosal bleb with injection of saline to confirm that the needle is not transmural. The needle remains inside the bleb and then 2 ml of ink are injected. Our own experience and some data suggest that the rate of complications is lower in patients who underwent this two-step approach. This is a different patient who had endoscopic tattooing 6 months ago. You can easily see the blue colored colonic wall. This permanent tattoo can be seen from the endoluminal side as well as from the peritoneal cavity thereby facilitates endoscopic or laparoscopic localization of marked findings.

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